

AMENDMENTS TO THE SPECIFICATION

Marked-up version of substitute specification

APPARATUS AND METHOD FOR ALLOCATING A CHANNEL BETWEEN MSC AND IWF UNIT IN CDMA MOBILE COMMUNICATION SYSTEM

FIELD OF THE INVENTION

[0001] This invention relates to a device and method for allocating a channel in a code division multiple access (~~CDMA~~) ("CDMA") mobile communication system; and more particularly, to a device and method for allocating an E1 channel between a mobile switching center (~~MSC~~) ("MSC") and an interworking function (~~IWF~~) ("IWF") unit in a CDMA mobile communication system.

DESCRIPTION OF THE PRIOR ART

[0002] ~~CDMA~~ Code division multiple access ("CDMA") radio data service currently in service is provided based on the IS-95A standard that supports low speed (8/13 Kbps) data service. CDMA radio data service based on the IS-95B standard is ~~to~~ be provided at higher speed (64Kbps), ~~so that relatively enabling more data are expected~~ to be processed during a predetermined period time.

[0003] ~~Currently, in order to allocate a channel between a mobile switching center (MSC) and an inter working function (IWF) unit, an E1 channel allocation method of assuming 5 channels to be one super channel is employed.~~ Currently, in order to allocate a channel between a mobile switching center ("MSC") and an interworking function ("IWF") unit, an E1 channel allocation method, which assumes 5 channels to be one

~~super channel, is employed. The E1 channel allocation method is suitable for a data service at low speed based on an IS-95A, however in case this allocation method is applied to a data service at high speed based on an IS-95B, there is a problem that a call disconnection is frequently occurred during call processing to thereby drop quality of the service since a traffic path congestion is occurred many times due to an increase in data quantity that is to be processed at the same time zone.~~ The E1 channel allocation method is suitable for low speed data service, which, as mentioned above is based on the IS-95A standard. However in cases where this allocation method is applied to high speed data service based on the IS-95B standard, calls are frequently disconnected during call processing, thereby reducing the quality of service. Calls are disconnected due to congestion caused by an increase in the quantity of data that is to be processed at the same time.

SUMMARY OF THE INVENTION

[0004] It is an object of the present invention to provide an apparatus and method for allocating an E1 channel between an MSC (~~mobile switching center~~) and an IWF (~~interworking function~~) unit in a ~~code division multiple access (CDMA)~~ CDMA mobile communication system, wherein an E1 super channel can be variably allocated to support both ~~an~~ the IS-95A service for low speed calls and ~~an~~ the IS-95B service for high speed calls.

[0005] In accordance with an aspect of the present invention, there is provided an apparatus for allocating an E1 channel between an MSC (~~mobile switching center~~) and an IWF (~~interworking function~~) unit in a ~~code division multiple access (CDMA)~~ mobile

communication system, the apparatus including a channel buffer for receiving and storing call processing data; a transmission routing serial interface random access memory (“SI RAM”) for storing the E1 channel allocation information; a CPM for reading out the call processing data that are stored in the channel buffer, storing received call processing data in the channel buffer, determining ~~which ones of high speed calls and low speed calls are more included in a plurality of call types in process currently~~ whether there are more high speed calls or low speed calls in a plurality of call types currently being processed and modifying the E1 channel allocation information stored in each of the transmission routing SI RAM and the reception routing SI RAM; a multi channel controlling unit for reading out the E1 channel allocation information stored in each of the transmission routing SI RAM and the reception routing SI RAM and allocating a super channel ~~including~~ made up of 5 channels or a super channel ~~including~~ made up of 10 channels to the E1 channel; and a serial-parallel converting unit for converting the call processing data from the CPM to serial data and then transmitting the serial data to the IWF unit; and converting the call processing data from the IWF unit to parallel data and then transmitting the parallel data to the CPM.

[0006] In accordance with another aspect of the present invention, there is provided a method for allocating an E1 channel between an MSC and an IWF unit in a CDMA mobile communication system, the method including the steps of: by a CPM, receiving from the high-level processor call type information about a plurality of call types ~~in process currently~~ being processed ~~from the high-level processor~~; by the CPM, determining, ~~which are more included~~ based on the call type information, whether there are more high speed calls or low speed calls in the plurality of call types ~~in process~~

~~currently being processed, high speed calls or low speed calls based on the call type information; if the high speed calls are more included in the plurality of call types in process currently, if there are more high speed calls in the plurality of call types currently being processed, then the CPM designates by the CPM, designating first/second super channel storage space for high speed calls of each transmission/reception routing SI RAM as an active zone and first/second super channel storage space for low speed calls of each transmission/reception routing SI RAM as a shadow zone; and by a multi channel controlling unit, reading out the E1 channel allocation information that is stored in each of the first/second super channel storage space for high speed calls and allocating a super channel including made up of 10 channels for high speed calls to the E1 channel; if the low speed calls are more included in the plurality of call types in process currently, by the CPM, designating if there are more low speed calls in the plurality of call types currently being processed, then the CPM designates first/second super channel storage space for low speed calls of each transmission/reception routing SI RAM as the active zone and first/second super channel storage space for high speed calls of each transmission/reception routing SI RAM as the shadow zone; and by the multi channel controlling unit, reading out the E1 channel allocation information that is stored in each of the first/second super channel storage space for low speed calls and allocating a super channel including made up of 5 channels for low speed calls to the E1 channel.~~

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] Other ~~objects and aspects~~ and advantages of the invention will become apparent from the following description of ~~the various~~ embodiments, with reference, where appropriate, to the accompanying drawings, in which:

[0008] Fig. 1 is a block diagram illustrating an apparatus for allocating an E1 channel between ~~a mobile switching center (MSC)~~ an MSC and an ~~interworking function (IWF)~~ IWF unit in a CDMA mobile communication system in accordance with the present invention;

[0009] Fig. 2A is a configuration of a transmission routing SI RAM included in an apparatus for allocating an E1 channel between ~~a mobile switching center (MSC)~~ an MSC and an ~~interworking function (IWF)~~ IWF unit in a CDMA mobile communication system in accordance with the present invention;

[00010] Fig. 2B is a configuration of a reception routing SI RAM included in an apparatus for allocating an E1 channel between ~~a mobile switching center (MSC)~~ an MSC and an ~~interworking function (IWF)~~ IWF unit in a CDMA mobile communication system in accordance with the present invention;

[00011] Fig. 3 is a flow chart illustrating a method for allocating an E1 channel between ~~a mobile switching center (MSC)~~ an MSC and an ~~interworking function (IWF)~~ IWF unit in a CDMA mobile communication system in accordance with the present invention;

[00012] Fig. 4A shows a signal flow through a super channel for high speed calls between ~~a mobile switching center (MSC)~~ an MSC and an ~~interworking function (IWF)~~ IWF unit in a CDMA mobile communication system in accordance with the present invention; and

[00013] Fig. 4B shows a signal flow through a super channel for low speed calls between a ~~mobile switching center (MSC)~~ an MSC and an ~~interworking function (IWF)~~ IWF unit in a CDMA mobile communication system in accordance with the present invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[00014] Fig. 1 is a block diagram illustrating an apparatus for allocating an E1 channel between a ~~mobile switching center (MSC)~~ an MSC and an ~~inter-working function (IWF)~~ IWF unit in a CDMA system in accordance with the present invention.

[00015] The apparatus for allocating the E1 channel between the MSC and the IWF unit in the CDMA system can be embodied using an "MPC8260" chip architected by a ~~Motorola Co.~~ MOTOROLA[®].

[00016] The apparatus includes a channel buffer 100, a transmission routing-SI RAM (SI RAM = serial interface routing RAM) 200, serial interface random access memory ("SI RAM") 200, a reception routing SI RAM 300, a ~~CPM (communication processor module) 400~~, communication processor module ("CPM") 400, a multi channel controlling unit 500 and a serial-parallel converting unit 600.

[00017] ~~The channel buffer 100 receives call processing data that are transmitted from a high-level processor and stores the same therein and also receives and stores call processing data therein that are transmitted from the CPM 400.~~ The channel buffer 100 receives call-processing data that is transmitted from a high-level processor and stores the same therein. The channel buffer 100 also receives and stores call-processing data that is transmitted from the CPM 400.

[00018] Fig. 2A shows the transmission routing SI RAM 200. The transmission SI RAM 200 is a routing table wherein a 16 bit entry is represented as a bit or byte unit on a basis of one E1 and ~~also a memory in which~~ where E1 channel allocation information is stored. The E1 channel allocation information is information ~~of~~ pertaining to whether a transmission super channel ~~including~~ made up of 5 channels ~~will be employed~~ or a transmission super channel ~~including~~ made up of 10 channels will be employed; when call processing data is ~~to be~~ transmitted to a an IWF unit 10. As shown in Fig. 2A, the transmission routing SI RAM 200 includes a first super channel storage zone for low speed calls 201 and a first super channel storage zone for high speed calls 202.

[00019] ~~In this case, the~~ The first super channel storage zone for low speed calls 201 stores the E1 channel allocation information about the transmission super channel ~~including~~ made up of 5 channels ~~therein~~.

[00020] ~~Also, the~~ The first super channel storage zone for high speed calls 202 stores the E1 channel allocation information about the transmission super channel ~~including~~ made up of 10 channels ~~therein~~.

[00021] ~~The~~ Referring to Fig. 2B, the reception routing SI RAM 300 is a routing table wherein a 16 bit entry is represented as a bit or byte unit on a basis of one E1 and ~~also a memory in which~~ where E1 channel allocation information is stored. The E1 channel allocation information is information ~~of~~ pertaining to whether a transmission super channel ~~including~~ made up of 5 channels ~~will be employed~~ or a transmission super channel ~~including~~ made up of 10 channels will be employed; when call processing data is ~~to be~~ transmitted from the IWF unit 10. As shown in Fig 2B, the reception routing SI

RAM 300 includes a second super channel storage zone for low speed calls 301 and a second super channel storage zone for high speed calls 302.

[00022] ~~In this case, the~~ The second super channel storage zone for low speed calls 301 stores the E1 channel allocation information about the reception super channel ~~including made up of 5 channels therein.~~

[00023] ~~Also, the~~ The second super channel storage zone for high speed calls 302 stores the E1 channel allocation information about the reception super channel ~~including made up of 10 channels therein.~~

[00024] Referring back to figure 1, a CPM 400 is shown. The ~~communication processor module (CPM)~~ CPM 400 reads out the call processing data that ~~are~~ is stored in the channel buffer 100 and then transmits the same to the serial-parallel converting unit 600. When the CPM 400 receives call processing data from the serial-parallel converting unit 600, the CPM 400 stores the same in the channel buffer 100.

[00025] When the CPM 400 receives call type information about a plurality of call types from the high-level processor during a call setup procedure, the CPM 400 determines, ~~which are more included in the plurality of call types, high speed calls or low speed calls based on the call type information.~~ based on the call type information, whether there are more high speed calls or low speed calls in the plurality of call types.

[00026] ~~If the low speed calls are more included,~~ there are more low speed calls, the CPM 400 modifies the E1 channel allocation information of the respective transmission/reception routing SI RAM 200/300 to ~~thereby~~ employ the E1 channel allocation information with the super channel ~~including made up of 5 channels.~~ On the other hand, ~~if the high speed calls are more included,~~ there are more high speed calls, the

CPM 400 modifies the E1 channel allocation information of the transmission/reception routing SI RAM 200/300 to ~~thereby~~ employ the E1 channel allocation information with the super channel ~~including~~ made up of 10 channels.

[00027] The multi channel controlling unit 500 reads ~~out~~ the E1 channel allocation information that is stored in the respective transmission/reception routing SI RAM 200/300 and then allocates the super channel ~~including~~ made up of 5 channels for low speed calls or the super channel ~~including~~ made up of 10 channels for high speed ~~to the E1 channel:~~ calls.

[00028] Upon receiving the call processing data from the CPM 400, the serial-parallel converting unit 600 converts the same to serial data and then transmits the serial data to the IWF unit 10 through a corresponding super channel. Also, upon receiving the call processing data from the IWF unit 10 through a corresponding super channel, the serial-parallel converting unit 600 converts the same to parallel data and then transmits the parallel data to the CPM 400.

[00029] Fig. 3 is a flow chart illustrating a method for allocating an E1 channel between a mobile switching center (MSC) and a IWF unit in a CDMA system in accordance with the present invention.

[00030] At the step S310, the CPM 400 receives call type information about a plurality of call types in process currently from the high-level processor.

[00031] ~~At the step S320, the CPM 400 determines which are more included in the plurality of call types in process currently, high speed calls or low speed calls based on the call type information.~~ At step S320, the CPM 400 determines, based on the call type information, whether there are more high speed calls or low speed calls in the plurality of

call types. Here, the high speed call represents an IS-95A service provided at 8/13 Kbps data rate and the low speed call represents an IS-95B service provided at 64Kbps data rate. The high speed calls may represent IS-95A service, provided at 8/13 Kbps data rate, and the low speed calls may represent IS-95B service, provided at 64Kbps data rate.

[00032] ~~As a result of determination, if the high speed calls are more included in the plurality of call types in process currently, at the step S330, the CPM 400 designates the first/second super channel storage zone for high speed 202/302 of the respective transmission/reception SI RAM 200/300 as active regions and at this time, designates the first/second super channel storage zone for low speed 201/301 of the respective transmission/reception SI RAM 200/300 as shadow regions.~~ As a result of the above determination, if there are more high speed calls in the plurality of call types being processed, then as shown at step S330, the CPM 400 may designate the first/second super channel storage zone for high speed calls 202/302 of the respective transmission/reception routing SI RAM 200/300 as active regions. The CPM 400 may also then designate the first/second super channel storage zone for low speed calls 201/301 of the respective transmission/reception routing SI RAM 200/300 as shadow regions.

[00033] ~~At the step S340, the multi channel controlling unit 500 reads-out~~ may read the E1 channel allocation information that is stored in each of first/second super channel storage zones for high speed calls 202/302 of the respective transmission/reception routing SI RAM 200/300 and ~~then allocates~~ may then allocate the super channel ~~including~~ made up of 10 channels for high speed calls to the E1 channel. Accordingly, ~~during one period time, it is performed to transmit~~ the call processing data

may be transmitted between the MSC and the IWF unit through the super channel ~~including~~ made up of 10 channels for high speed calls in the CDMA system, as further shown in Fig. 4A.

[00034] ~~As a result of determination, if the low speed calls are more included in the plurality of call types in process currently, at the step S350, the CPM 400 designates the first/second super channel storage zone for low speed 201/301 of the respective transmission/reception SI RAM 200/300 as active regions and at this time, designates the first/second super channel storage zone for high speed 202/302 of the respective transmission/reception SI RAM 200/300 as shadow regions.~~ Alternatively, if there are more low speed calls in the plurality of call types being processed, then as shown at step S350, the CPM 400 may designate the first/second super channel storage zone for low speed calls 201/301 of the respective transmission/reception routing SI RAM 200/300 as active regions. The CPM may also then designate the first/second super channel storage zone for high speed calls 202/302 of the respective transmission/reception routing SI RAM 200/300 as shadow regions.

[00035] At the step S360, the multi channel controlling unit 500 ~~reads out~~ may read the E1 channel allocation information that is stored in each of first/second super channel storage zones for low speed calls 201/301 of the respective transmission/reception routing SI RAM 200/300 and then allocates the super channel ~~including~~ made up of 5 channels for low speed calls to the E1 channel. Accordingly, ~~during one period time, it is performed to transmit the call processing data~~ may then be transmitted between the MSC and the IWF unit through the super channel ~~including~~ made up of 5 channels for low speed calls in the CDMA system, as shown in Fig. 4B.

[00036] ~~As described above, by performing an~~ By employing the above apparatus
and method for allocating an E1 channel between the MSC and the IWF unit in the
CDMA system in accordance with the present invention, the E1 channel can be variably
allocated to support both the IS-95A and the IS-95B services provided respectively at low
and high speeds, respectively.